

Movement of Longan Fruit, *Dimocarpus longan*, from Hawaii into other regions of the United States

Qualitative, Pathway-Initiated Pest Risk Assessment

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A. Introduction

This pest risk assessment was prepared by the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture (USDA) to examine plant pest risks associated with the movement into other parts of the United States of **fresh longan fruit (*Dimocarpus longan*) grown in Hawaii**. This is a qualitative pest risk assessment, that is, estimates of risk are expressed in qualitative terms such as high or low as opposed to numerical terms such as probabilities or frequencies.

International plant protection organizations (e.g., North American Plant Protection Organization (NAPPO), International Plant Protection Convention (IPPC) of the United Nations Food and Agriculture Organization (FAO)) provide guidance for conducting pest risk analyses. The methods used to initiate, conduct, and report this plant pest risk assessment are consistent with guidelines provided by NAPPO, IPPC and FAO. The biological and phytosanitary terms (e.g., introduction, quarantine pest) used in this document conforms with the *NAPPO Compendium of Phytosanitary Terms* (NAPPO 1995) and the *Definitions and Abbreviations* (Introduction Section) in *International Standards for Phytosanitary Measures, Section 1—Import Regulations: Guidelines for Pest Risk Analysis* (FAO 1995).

Pest risk assessment is one component of an overall pest risk analysis. The *Guidelines for Pest Risk Analysis* provided by FAO (1995) describe three stages in pest risk analysis. This document satisfies the requirements of FAO Stages 1 (initiation) and 2 (risk assessment).

The Food and Agriculture Organization (FAO, 1995) defines "pest risk assessment" as "Determination of whether a pest is a quarantine pest and evaluation of its introduction potential". "Quarantine pest" is defined as "A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled" (FAO, 1995; NAPPO, 1995). Thus, pest risk assessments should consider both the likelihood and consequences of introduction of quarantine pests. Both issues are addressed in this qualitative pest risk assessment.

This document presents the qualitative plant pest risk assessment findings. The assessment methods or the criteria used to rate the various risk elements have not been described in detail. The details of the methodology and rating criteria can be found in the "template" document: *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments, version 4.0* (USDA, 1995); to obtain a copy of the template, contact the individual named in the proposed regulations.

B. Risk Assessment

1. Initiating Event: Proposed Action

This pest risk assessment is commodity-based, and therefore "pathway-initiated"; the assessment is in response to a request for USDA authorization to allow movement of a particular commodity presenting a potential plant pest risk. In this case, the movement of **fresh longan fruits (*Dimocarpus longan*) grown in Hawaii** into other parts of the U.S. is a potential pathway for introduction of plant pests. Regulatory authority for the movement of fruits and vegetables from Hawaii into other parts of the U. S. is found in 7 CFR §318.13.

Dimocarpus longan Lour. belongs to the family Sapindaceae which consists of about 125 genera with more than 1000 species with wide distribution in the tropics and warm regions. Species of *Dimocarpus* are grown in California (Bailey, 1937), Florida, Hawaii, and Puerto Rico. *D. longan*

looks much like litchi although it grows faster and more vigorously than litchi in Hawaii (Neal, 1965). The ripe fruit has a thin nearly smooth indehiscent crust (shell like) marked by a honeycomb pattern (Neal, 1965; Bailey, 1949).

2. Assessment of Weediness Potential of longan, *Dimocarpus longan*

Table 1 shows the results of the weediness screening for *Dimocarpus longan*. These findings did not require a pest-initiated risk assessment.

Table 1: Process for Determining Weediness Potential of Commodity	
Commodity: <i>Dimocarpus longan</i> Lour. - (Longan)	
Phase 1: Longan is not widely prevalent in the United States.	
Phase 2: Is the species listed in:	
<u>NO</u>	<i>Geographical Atlas of World Weeds</i> (Holm, 1979)
<u>NO</u>	<i>World's Worst Weeds</i> (Holm, 1977)
<u>NO</u>	<i>Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act</i> (Gunn & Ritchie, 1982)
<u>NO</u>	<i>Economically Important Foreign Weeds</i> (Reed, 1977)
<u>NO</u>	Weed Science Society of America list (WSSA, 1989)
<u>NO</u>	Is there any literature reference indicating weediness (e.g., AGRICOLA, CAB, Biological Abstracts, AGRIS; search on "species name" combined with "weed").
Phase 3: Conclusion:	
This commodity does not pose a significant risk as a weed.	

3. Previous Risk Assessments, Current Status and Pest Interceptions

3a. Decision history for *Dimocarpus* spp.

There are no previous risk assessments (decision sheets) on *Dimocarpus* from Hawaii.

3b. Interceptions from Hawaii FY 1985-95 309 database and PINET.

PEST	HOST	TOTAL
BACTROCERA DORSALIS	DIMOCARPUS LONGAN (FRUIT)	1
PSEUDOCOCCIDAE, SPECIES OF	DIMOCARPUS LONGAN (FRUIT)	1

4. Pest List: Pests Associated with longan in Hawaii

Table 2 shows the pest list for *Dimocarpus* spp. which was developed after a review of the information sources listed in USDA (1995). The pest list summarizes information on the distribution of each pest, pest-commodity association, and regulatory history.

Table 2: Pest List - <i>Dimocarpus</i> spp.			
Scientific Name, Classification	Distribution ¹	Comments ²	References
Algae			
<i>Cephaleuros virescens</i> Kunze Algae leaf spot	HI,US	a,c,m,o	Alfieri <i>et. al.</i> , 1994
<i>Strigula</i> sp.	HI,US	a	Alfieri <i>et. al.</i> , 1994
Pathogens			
None found			
Arthropods			
<i>Bactrocera cucurbitae</i> Coquillett (Diptera: Tephritidae)	HI,US ₃	h,z _i	White, 1992; USDA, 1986
<i>Bactrocera dorsalis</i> Hendel (Diptera: Tephritidae)	HI,US ₃	h,z _i	USDA, 1996
<i>Ceratitidis capitata</i> (Wiedemann) (Diptera: Tephritidae)	HI,US ₃	h,z _i	White, 1992; BASS, 1985; Liquido, 1991
<i>Cryptophlebia ombrodelta</i> (Lower) (Lepidoptera: Tortricidae)	HI	z _i	Kunishi & Kitagawa, 1996

<i>Dysmicoccus neobrevipes</i> Breadsley (Homoptera: Pseudococcidae)	HI,FL	m,n,x,y,z _e	Anon, 1994; Harris & Maramorosch, 1980; USDA, 1996
<i>Eriophyes litchii</i> Keifer	HI	m,z _e	Huang, 1967
<i>Maconellicoccus hirsutus</i> (Green) (Homoptera: Pseudococcidae)	HI	m,n,x,z _e	USDA, 1996

¹ Distribution legend: HI = Hawaii; US = other parts of the United States; FL = Florida

² Comments:

- a = Pest mainly associated with a plant part other than the commodity.
- c = Listed in non-reportable dictionary as non-actionable.
- h = Quarantine pest: pest has limited distribution in the U.S. and is under official control as follows: (1) pest listed by name in USDA's pest dictionary, (2) pest is a program pest.
- m = The pest occurs within the PRA area and has been reported to attack the specified host species in other geographic regions; but has not been reported to attack the specified host in the PRA area/
- n = Listed in the USDA catalogue of intercepted pests as actionable.
- o = Pest does not meet the geographic or regulatory definition of a quarantine pest.
- x = Multiple interception records exist.
- y = Pest is a vector of plant pathogens.
- z_e = External pest: is known to attack or infest *Dimocarpus* spp. fruits and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.
- z_i = Internal pest: is known to attack or infest *Dimocarpus* spp. fruits and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.

3 *Bactrocera cucurbitae*, *B. dorsalis*, and *Ceratitis capitata* have been detected on occasion in the United States. Whenever they are detected, a quarantine is established and an eradication program implemented. These fruit flies are considered to be quarantine pests in the United States.

5. List of Quarantine Pests

The list of quarantine pests for commercial shipments of longan fruits from Hawaii is provided in Table 3. Should any of these pests be intercepted on commercial (or any other) shipments of longan, quarantine action will be taken.

Table 3: Quarantine Pests: Longan fruits Consumption	
Pathogens	None
Arthropods	<i>Bactrocera cucurbitae</i> <i>Bactrocera dorsalis</i> <i>Ceratitis capitata</i> <i>Cryptophlebia ombrodelta</i> <i>Dysmicoccus neobrevipes</i> <i>Eriophyes litchii</i> <i>Maconellicoccus hirsutus</i>

6. Quarantine Pests Likely to Follow Pathway (i.e., Quarantine Pests Selected for Further Analysis)

Only those quarantine pests that can reasonably be expected to follow the pathway, *i. e.* be included in commercial shipments of *Dimocarpus longan* (see USDA, 1995 for selection criteria) were analyzed in detail. Only quarantine pests listed in Table 4 were selected for further analysis and subjected to steps 7-9 below. *D. neobrevipes* and *M. hirsutus* have not been associated with longan in Hawaii; however, they have been intercepted on fruits from other tropical areas and were included for further evaluation. *E. litchii* has been reported as a pest on longans elsewhere so it was also included for further evaluation.

Table 4: Quarantine Pest Selected for Further Analysis: Hawaiian Longan Fruits for Consumption	
Pathogens	None
Arthropods	<i>Bactrocera cucurbitae</i> <i>Bactrocera dorsalis</i> <i>Ceratitis capitata</i> <i>Cryptophlebia ombrodelta</i> <i>Dysmicoccus neobrevipes</i> <i>Eriophyes litchii</i> <i>Maconellicoccus hirsutus</i>

7. Economic Importance: Consequences of Introduction

The consequences of introduction was considered for each quarantine pest selected for further analysis. For qualitative, pathway-initiated pest risk assessments, these risks are estimated by rating each pest with respect to five risk elements. A full description of these elements and rating criteria can be found in USDA (1995). Table 5 shows the risk ratings for these risk elements.

Table 5: Risk Rating: Consequences of Introduction						
Pest	Climate/ Host	Host Range	Dispersal	Economic	Environ- mental	Risk Rating
<i>Bactrocera cucurbitae</i>	high	high	high	high	high	high
<i>Bactrocera dorsalis</i>	high	high	high	high	high	high
<i>Ceratitis capitata</i>	high	high	high	high	high	high
<i>Cryptophlebia ombrodelta</i>	medium	high	medium	medium	medium	medium
<i>Dysmicoccus neobrevipes</i>	low	high	low	medium	medium	medium
<i>Eriophyes litchii</i>	medium	medium	low	medium	medium	medium
<i>Maconellicoccus hirsutus</i>	medium	high	medium	high	high	high

8. Likelihood of Introduction

Each pest was rated with respect to introduction potential *i.e.*, entry and establishment. Two separate components were considered. First, the amount of commodity likely to be moved was estimated. More movement leads to greater risk; the results is a risk rating that applies to the commodity and country in question and is the same for all quarantine pests considered. Second, five biological features concerning the pests and its interactions with the commodity were considered. The resulting risk ratings were specific to each pest. The cumulative risk rating for introduction was considered to be an indicator of the likelihood that a particular pest would be introduced. A full description of these elements and rating criteria can be found in USDA (1995). Table 6 shows the ratings for these risk elements.

Table 6: Risk Rating: Likelihood of Introduction							
Pest	Quantity of commodity imported annually	Likelihood survive postharvest treatment	Likelihood survive shipment	Likelihood not detect at port of entry	Likelihood moved to suitable habitat	Likelihood find suitable host	Risk rating
<i>Bactrocera cucurbitate</i>	low	high	high	high	high	high	high
<i>Bactrocera dorsalis</i>	low	high	high	high	high	high	high
<i>Ceratitis capitata</i>	low	high	high	high	high	high	high
<i>Cryptophlebia ombrodelta</i>	low	medium	medium	medium	medium	low	medium
<i>Dysmicoccus neobrevipes</i>	low	high	high	medium	medium	medium	medium
<i>Eriophyes litchii</i>	low	medium	medium	high	low	low	medium
<i>Maconellicoccus hirsutus</i>	low	high	high	medium	low	low	medium

9. Conclusion: Pest Risk Potential and Phytosanitary Measures

The measure of pest risk potential combines the risk ratings for consequences and likelihood of introduction as described in USDA (1995). Table 7 shows the estimated pest risk potential for the quarantine pests selected for further analysis for the movement of *Dimocarpus longan*.

Table 7: Pest Risk Potential, Quarantine Pests, <i>Dimocarpus longan</i> from Hawaii	
Pest	Pest risk potential
<i>Bactrocera cucurbitae</i>	High
<i>Bactrocera dorsalis</i>	High
<i>Ceratitis capitata</i>	High
<i>Cryptophlebia ombrodelta</i>	Medium
<i>Dysmicoccus neobrevipes</i>	Medium
<i>Eriophyes litchii</i>	Medium
<i>Maconellicoccus hirsutus</i>	High

For those pest, except *Maconellicoccus hirsutus*, receiving a PRP risk rating of high, we recommend specific phytosanitary measures, port-of-entry inspection is not considered sufficient to provide phytosanitary security. *Maconellicoccus hirsutus* has not been associated with *Dimocarpus longan* in Hawaii and therefore movement of the fruit is unlikely to serve as a pathway for introduction. Although *M. hirsutus* is established in Hawaii it has had little or no impact, probably due to the introduction of a parasite about the same time. PPQ currently inspects other commodities which serve as hosts for this pest from other areas. If this pest is intercepted on Hawaiian longan fruits, Operational Support staff may establish appropriate sanitary and phytosanitary measures they believe necessary to mitigate pest risk. The pest risk management phase of the PRA is not part of this document. Appropriate sanitary and phytosanitary measures to mitigate pest risk will be determined during the pest risk management phase.

PPQ has intercepted over 800 pests on longan fruits from other tropical areas since 1985; however, virtually all external pests listed could be detected by inspection. Some of these same pests occur in Hawaii in addition to other polyphagous quarantine pests and have been intercepted as hitchhikers with other commodities. Should any of these pests be intercepted on commercial (or any other) shipments of *Dimocarpus longan*, quarantine action may be taken.

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